

THE UNIVERSITY OF
TENNESSEE
KNOXVILLE



DEPARTMENT OF ELECTRICAL
ENGINEERING & COMPUTER SCIENCE



Annual Report 2016





Annual Report 2016 Contents

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Department At A Glance

DEGREES OFFERED

Bachelor of Science

Electrical Engineering
Computer Engineering
Computer Science

Master of Science

Electrical Engineering
Computer Engineering
Computer Science

Doctor of Science

Electrical Engineering
Computer Engineering
Computer Science

ENROLLMENT FIGURES

Enrollment (Full-Time)

Academic Year 2016-2017

Undergraduate	790
M.S.	82
Ph.D.	202
Total	1074

Degrees Granted

Academic Year 2015-2016

Undergraduate	137
Graduate	61
Total	198

Faculty

Academic Year 2016-2017

Professors	23
Associate Professors	9
Assistant Professors	9
Lecturers	3
Total	44

Fall 2016 Freshman Enrollment

Computer Science	102
Computer Engineering	68
Electrical Engineering	45
Total EECS Freshmen	215

Freshman enrollment is a 30% increase over the previous year.

ACCREDITATION

All undergraduate degree programs under the Department of Electrical Engineering and Computer Science are accredited by ABET.

2015 ASEE SURVEY DATA

- 22nd nationally among public EECS programs in research expenditures per tenure-line faculty member.
- 12th nationally among public EECS programs in PhD enrollment per tenure-line faculty member. PhD enrollment grew 16% from Fall 2012 – Fall 2015.
- Research expenditures grew 43% from FY12 to FY16.

(Survey data from the American Society for Engineering Education)

Current Faculty Includes:

2	UNIVERSITY DISTINGUISHED PROFESSORS
3	ENDOWED CHAIRS
8	ENDOWED PROFESSORSHIPS
3	NAE MEMBERS
8	IEEE FELLOWS
10	NSF CAREER AWARDEES

Department Leadership



Leon Tolbert
Department Head



Jens Gregor
Associate Department
Head
*External Relations &
Graduate Affairs*



Syed Kamrul Islam
Associate Department
Head
Academic Affairs

Awards for 2015-2016

Dr. Yilu Liu

was selected to the National
Academy of Engineering (NAE).
(see story on p. 6)

Dr. Wei Gao, Dr. Donatello Materassi and Dr. Kai Sun

received NSF CAREER Awards.
(see story on page 17)

Dr. Jack Dongarra

was elected a foreign member of the Russian
Academy of Sciences (RAS). The RAS is Russia's
highest scientific society and principal coordinat-
ing body for research in natural and social scienc-
es, technology, and production.

Dr. Micah Beck

received a Fulbright Scholar Award.

Dr. Jayne Wu

received the 2016 B. Otto and Kathleen Wheeley
Award for Excellence in Technology Transfer.

Outstanding Achievement

Award from EPRI:

D. Costinett, B. Trento, C. Zhao, L. Jiang,
Z. Zhang, B. Liu

Systems: Women in EECS@UTK

In April 2016, Systems was awarded the Charles R. Bur-
chett Extraordinary Contributions to Campus Life Ci-
tation at the Chancellor's Honors Banquet. This award
is named for the World War II veteran, former Knox
County Schools administrator, and UT dean of stu-
dents to honor students and student organizations for
extraordinary contributions to campus life.

Paper Award:

Z. Zhang, F. Wang, L. M. Tolbert, B. Blalock, D. Cos-
tinett, "Evaluation of Switching Performance of
SiC Devices in PWM Inverter-Fed Induction Motor
Drives," Second place prize paper award from IEEE
Transactions on Power Electronics, 2016

Joel Seligstein

received the UT Alumni Promise Award

Ph.D. candidate Bin Wang and Dr. Kai Sun

received a Most Valuable Player award recognized by
the Control Room Solution Task Team of North Amer-
ican SynchroPhasor Initiative (NASPI) for the devel-
opment of an online Test Cases Library on Oscillation
Source Location.

Gefei "Derek" Kou

was named one of the North American SynchroPhasor
Initiative (NASPI) Outstanding Graduate Students for
2016.

Seven EECS faculty members received Tickle College of Engineering Awards in 2016:

Dr. Kevin Tomsovic

Brooks Distinguished Professor

Dr. Fred Wang

Research Achievement

Dr. Hairong Qi

Research Achievement

Dr. Wei Gao

Professional Promise in Research

Dr. Aly Fathy

Teaching Fellow

Dr. Kai Sun

Professional Promise in Research

Dr. Daniel Costinett

Teaching Fellow

Two EECS faculty members received Chancellor's Awards in 2016:

Dr. Leon Tolbert

Research Achievement

Dr. Gong Gu

Professional Promise in Research



A message from the department head

In 2016, the University of Tennessee community mourned the loss of its greatest ambassador, Coach Pat Head Summitt. What she left us was the ideal that women can excel in sports, academics, and in business. Her work ethic, commitment to excellence, and caring spirit for her players, coaches, and friends have inspired many to emulate her. In this issue of our department's annual report, we highlight the achievements of our women faculty and students. In a field with a low percentage of women, the individuals highlighted here have all achieved success through their own intellect, dreams, creative efforts, and persistence.

Dr. Yilu Liu, the lone female Governor's Chair at The University of Tennessee, was inducted into the National Academy of Engineering (NAE) in 2016 (Page 6). This is one of the highest honors that those in our profession can achieve, and a testament to her contributions to engineering. She is known nationally and internationally for her power system monitoring and visualization system that she

and her research group developed over many years. Many utilities make use of the data that is gathered nationally to improve power system operations and assist in planning future upgrades.

Systers, Women in EECS @ UTK, was formed in 2013 to promote the recruitment, retention, and mentoring of women students in the department. The many activities undertaken by the group each year (Page 7) benefits the entire department and also others in the Tickle College of Engineering. The community spirit that is being built by Systers has helped everyone in EECS.

Our 10 women faculty members highlighted in this report (Page 9) have made many contributions in research, teaching, and service. Among them are 3 IEEE Fellows and 4 NSF CAREER Award winners. They serve as role models to all of our students and younger faculty.

We also highlight the contributions of CURENT (Page 12), our NSF/DOE Engineering Research Center, that has made the graduate power program at UT the best in the nation. The Center also has many efforts to encourage K-12 students to pursue STEM-related degrees and to involve undergraduates in research as well. In addition,

the power electronics faculty received a \$2.6 million grant to establish a graduate traineeship in wide bandgap power electronics to encourage more U.S. citizens to pursue degrees in this area (Page 19).

We also highlight Professor Emeritus, Dr. Robert Bodenheimer (Page 15). A graduate fellowship established by alumni in his name has encouraged many students to pursue advanced degrees. Recent new contributions to the endowment will expand the number of students we can provide fellowships to each year.

The issue also highlights the many awards (including 3 NSF CAREER Awardees (page (17))) that our dedicated faculty and students earned during this past year (Page 4). Our department continues to grow in number of students and faculty, and they continue to bring distinction to our university. I encourage you to visit our department when you get a chance to see firsthand the many exciting research and teaching innovations that are happening in EECS at UT every day.

Leon Tolbert



By David Goddard

Yilu Liu, the joint UT-Oak Ridge National Laboratory Governor's Chair for Power Systems, was elected a member of the National Academy of Engineering in February 2016 and inducted during a ceremony in Washington, D.C. in October, 2016.

Being elected to the academy is among the highest professional distinctions accorded to an engineer. Liu was elected "for her innovations in electric power grid monitoring, situational awareness, and dynamic modeling," according to the NAE. She is one of 34 American university professors from the group of 80 engineers chosen from across the United States in 2016.

"To be recognized by the National Academy of Engineering is confirmation of the value that our work holds for the modern society," said Liu. "Not only that, but it validates all of the hours, effort, and research put in by people at UT and ORNL."

She added that the award might help her and her fellow faculty members at UT and ORNL attract more high-end students.

EECS Professor Elected a Member of the National Academy of Engineering

Liu, who serves as a professor of electrical engineering, becomes the fifth member of the Tickle College of Engineering so honored.

She joins John Fisher Distinguished Professor Mark Dean and University Distinguished Professor Jack Dongarra, both of EECS; fellow UT-ORNL Governor's Chair for Nuclear Materials Steven Zinkle of nuclear engineering; and George Pharr, Chancellor's Professor and McKamey Professor of Engineering, and joint faculty scientist in the materials science and technology division at ORNL.

Liu is also a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) and deputy director of CURENT (Center for Ultra-Wide-Area-Resilient Electric Energy Transmission Networks) Engineering Research Center at UT.

"This is a great honor for Dr. Liu and our university, and we are proud that she's being recognized," said Chancellor Jimmy G. Cheek. "Having faculty of this caliber on our campus, and having their contributions acknowledged by the National Academy, underscores the quality of our education and research. It is clear that the work being done on our campus is changing the world for the better."

Liu's research at UT, ORNL, and CURENT focuses on smart-grid technologies in electric power production and distribu-

tion, with an eye on developing new and better ways to monitor and understand the flow of electrical energy through the nation's power grid.

"This prestigious honor highlights the immense value of Yilu's efforts to understand and enhance the flow of electrical energy through the nation's power grid," said ORNL Director Thom Mason. "A reliable, efficient grid is essential for the nation's security, economy, and way of life, and her exceptional work illustrates the benefit of combining the strengths of the university and a national laboratory."

"Yilu's research is of vital importance, and her recognition by the National Academy of Engineering is well deserved."

NAE President C. D. Mote Jr. said that academy membership honors those who have made outstanding contributions to "engineering research, practice, or education ... the pioneering of new and developing fields of technology, making major advancements in traditional fields of engineering, or developing/implementing innovative approaches to engineering education."



Systers: Women in EECS@UTK

The mission of Systers: Women in EECS @ UTK is to recruit, mentor and retain women in the Department of Electrical Engineering and Computer Science at the University of Tennessee. After three years, Systers has grown to include 75 active members, and diversified to include a 22% male membership.

At the core of Systers are seven programs designed specifically for executing this mission.

Ongoing programs:

1. Mentorship- Systers creates mentorship pairs according to career interest and sponsors monthly mentorship activities.

Recent Mentorship Highlights:

- Over the last year, Systers matched up 23 mentorship pairs and conducted five mentorship activities, including sponsored coffee, lunch, or dinner events where mentorship pairs were encouraged to meet up and engage in conversation.
 - Systers also held a Mentorship and Circles Kickoff event on September 6, 2016. Systers leaders discussed mentorship pairing and how Circles will be formed this semester. Circles has created several groups of members who meet up for lunch once a week to discuss topics from the "Lean In: For Graduates" book by Sheryl Sandberg.
- 2. Circles-** Systers arranges

groups of women who meet weekly for discussion about all things professional and personal. Other activities include weekly Lean-In seminars, Circles Game Show Night and the Circles Graduate Student Reception.

Recent Circles Highlights:

- Weekly Lean In Seminars- This

also expressed that the seminars opened them up to many topics that they had never felt comfortable talking about, and helped them set professional goals.

3. Tutoring- In both the Fall and Spring semesters, Systers sponsors weekly free tutoring hours for those unable to find help in undergraduate classes.

The program offers 15 fixed tutoring hours per week for undergraduates, and utilizes three hired tutors.

Periodic programs:

4. Skills Series- Systers hosts workshops on common skills necessary for success in industry and/or academia. The four Skills Series Workshops held between September 2015 and March 2016 focused on soldering, Distributed Version

Control, technical presentations, and LaTeX.

5. Outreach Program- Systers sponsors engaging events with local K-12 students to spark female interest in engineering, such as the Little Systers outreach event. They also participate in outreach booths at events like Engineers Day at UT, Introduce a Girl to Engineering Day at Y-12, and the Women in STEM Research Symposium.

Recent Outreach Highlights:

- Little Systers Outreach Event This event featured a full day of demonstrations and hands-on activities designed to intro-



was a one-hour course which met weekly, between January and April, for a book study on Sheryl Sandberg's "Lean In: For Graduates." Conducted by Mwamba Bowa, the purpose of the course was to identify professional barriers by addressing the crippling barriers that exist between a woman and her professional goals, bridge cultural gaps, emphasize professional development topics and build community. Most of the 15 Systers members who participated expressed that they felt that the seminar helped them build up more confidence. They

duce high school girls to the fields of electrical engineering and computer science in a fun, easy-to-understand way. 25 girls attended, representing more than 10 area high schools.

6. Social and Departmental events- These include the annual EECS Welcome Back Celebration, held in August 2016, the Sisters Third Birthday Banquet and the Graduate Student Reception, held on February 26, 2016. This last event included discussion on how to be successful in EECS graduate school and what Sisters offers to support grad students. At least 30 female EECS graduate students attended the event.

Occasional programs:

7. Conference Travel

Awards- Sisters funds members to attend professional conferences for women in technology, such as the Grace Hopper Celebration of Women in Computing, and SEWIC2015, the Southeastern Women In Computing event. SEWIC2015 was an event hosted at the Georgia Tech Conference Center Nov 13-15, 2015 and featured professional development workshops, research and educational talks, a career fair, and poster sessions, all aimed at supporting and encouraging women in tech. Dr. Katie Schuman gave a “how to survive graduate school” talk, and then led a discussion with a panel, including Sisters members Kelley Deuso and Zahra Mahoor, during which they gave advice and answered questions from the audience.

Sisters’ achievements and activities have been recognized by being featured in such publications as Tennessee Engineer, UT Today and the 2015 EECS Annual Report. In April 2016, Sisters was awarded the Charles

R. Burchett Extraordinary Contributions to Campus Life Citation at the Chancellor’s Honors Banquet. This award is named for the World War II veteran, former Knox County Schools administrator, and UT dean of students to honor students and student organizations for extraordinary contributions to campus life. Sisters was also nominated for



the Large Student Organization of the Year under the Division of Student Life.

Sisters’ mission continues into a new school year, filled with activities designed to broaden and enrich EECS students’ experiences.

In August 2016, Sisters hosted the fourth annual EECS Welcome Back Celebration, along with the IEEE and ACM student organizations. This event featured a booth fair attended by nine employers and five student organizations, five laboratory demonstrations, three workshops and information sessions, a pizza party, a scavenger hunt, and a social media raffle. Its purpose was to help grow the community in the EECS Department and to provide students with resources before the school year began.

On October 19-21, 2016, EECS sponsored two Sisters members to attend the Grace Hopper Celebration of Women In Computing in Houston, Texas and represent the department, as well as the University of Tennessee.

Sisters President Divyani Rao says, “Sisters has provided us with a great community for women in the EECS Department.

It is all about developing relationships with each other through our programs. We will be hosting our outreach event ‘Little Sisters’ in Spring semester where we hope to bring in high school girls to our department to introduce them to Electrical Engineering and Computer Science. We will also be hosting multiple mentorship events such as Mentorship Games/Trivia night and also sponsor mentorship meals. Additionally, we hope to build a better community for women by hosting Circles events such as the Circles Movie night. From being mentored, to coming full circle and becoming mentors themselves, we have seen our members reach great heights and this year, we look forward to see Sisters grow even more.”



Women are an increasingly important part of the EECS faculty

In the Electrical Engineering & Computer Science Department at the University of Tennessee, women make up almost twenty-five percent of the faculty.



Dr. Chien-fei Chen serves as the Director of Education and Diversity Programs and Research Professor for

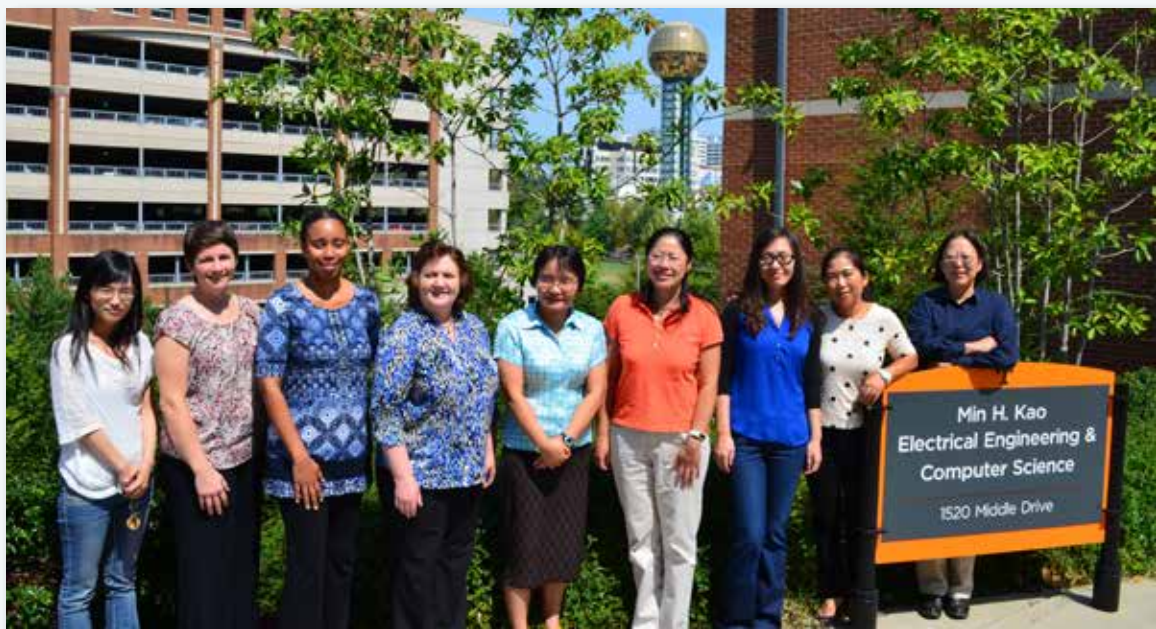
CURRENT. She is also an adjunct faculty member in the department of sociology. Dr. Chen received her Ph.D. in Sociology from Washington State University.

Her research in social psychology focuses on how the content and structure of social relations are mediated through social norms, networks, interpersonal communication and related psychological factors at both individual and group levels. Her research facilitates the investigation of the social and structural processes that motivate behavioral and psychological changes in relation to issues of energy and technology.

Dr. Chen's environmental research areas include energy literacy and the diffusion of renewable energy knowledge, environmental beliefs, attitudes, behaviors and public opinions over environmental issues.

Her publications appear in the IEEE, Energy Research and Social Science, Journal of Environmental Psychology, American Sociological Association, Behavior, Energy and Climate Change Conference, and others.

Since 2011, she has been the lead in the linkage of social



(From L. to R.) Dr. Xiaojie Shi, Dr. Judy Day, Dr. Nicole McFarlane, Dr. Lynne Parker, Dr. Jayne Wu, Dr. Hairong Qi, Dr. Jinyuan "Stella" Sun, Dr. Yan Xu, Dr. Yilu Liu (not pictured: Dr. Chien-fei Chen)

psychology and grid technologies for CURRENT. Dr. Chen most recently received several grant awards from NSF to conduct interdisciplinary studies regarding social-psychological factors and micro-grid resilience and acceptance of grid technologies.



Dr. Judy Day currently holds a joint faculty position as an assistant professor in the Department of Mathematics and the Department of Electrical Engineering and Computer Science at the University of Tennessee, Knoxville. She received her Ph.D. in Mathematics from the University of Pittsburgh in 2007 and spent the following three years as a postdoctoral fellow at the Mathematical Biosciences Institute in Columbus, OH.

Dr. Day's primary research is focused on the development and analysis of mathematical models

relating to the immune response to various stimuli and the application of control methodologies to modulate the immune response with therapeutic inputs. Her interests are motivated by the potential of mathematical and engineering techniques to assist in answering vital questions in the medical field. Dr. Day's objective is to conduct research within an interdisciplinary group to promote a symbiotic relationship among the various areas of expertise in hopes of acquiring results and developing tools of clinical relevance and academic significance.



Dr. Yilu Liu is the first woman Governor's Chair Professor at UT, and a Fellow of IEEE. She joined The University of Tennessee in August 2009 from Virginia Tech. She also has a joint appointment with Oak Ridge National Labora-

tory. Dr. Liu received her Ph.D. in Electrical Engineering from the Ohio State University in 1989.

Liu's work focuses on developing new and better ways to monitor and understand the flow of energy through the nation's power grid on a large scale. While at Virginia Tech, she led the creation of FNET/GridEye, the North American power grid monitoring network. Her group continues to operate FNET/GridEye as a joint UT/Oak Ridge National Laboratory project. She has also researched ways of developing the "smart grid," a term used to describe the next generation of electric transmission technology that will move energy more efficiently and effectively from where it is generated to where it is used.

Liu is the co-director of the Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks (CURENT), a National Science Foundation (NSF) Engineering Research Center. CURENT is jointly supported by NSF and the Department of Energy, and is led by the University of Tennessee.

Dr. Liu has said to women who are considering a career in engineering, "It is a fun career to be in and you will never be out of a job or interesting things to do. Since women are the minority in engineering, your job prospects are even stronger."



Dr. Nicole McFarlane

received her Ph.D. from the University of Maryland, College Park in 2010 and received her bachelor's and master's degree from Howard University in 2001 and 2003, respectively. She is currently an Assistant Professor in the Department of Electrical Engineering and Computer Science at the University of Tennessee,

Knoxville. Her research interests include mixed signal integrated circuit design, analysis of information and power efficiency tradeoffs in integrated circuit design, noise theory for electronic systems and development of biosensors for lab-on-chip applications.

Some of Dr. McFarlane's ongoing research includes projects to: improve spatial resolution of biosensors using nanofabrication of vertically aligned carbon nanofibers for observation of biological cell behavior; use CMOS mixed signal circuit design in conjunction with nanofabrication to develop automated wireless glucose sensing systems for improved diabetic health outcomes; and take advantage of CMOS technology to develop novel imaging sensors for medical/nuclear imaging and radiation detection.



Dr. Lynne E. Parker,

a native Knoxville, is a Professor in the EECS Department, having joined UTK in 2002. At UTK, she is the founder and director of the Distributed Intelligence Laboratory, which performs research in multi-robot systems, sensor networks, machine learning, and human-robot interaction. She is also a visiting researcher in the Computer Science and Mathematics Division at Oak Ridge National Laboratory (ORNL), where she worked as a Distinguished Research and Development Staff Member for several years prior to joining UTK.

After receiving her BS in Computer Science from Tennessee Technological University in 1983, she received her MS in Computer Science at the University of Tennessee, Knoxville in 1988 and her Ph.D. in Computer Science from Massachusetts In-

stitute of Technology in 1994.

Dr. Parker is a leading international researcher in the field of distributed intelligence, and has published over 100 articles, including five edited books on the topic of distributed robotics. For this research, she was awarded the 2000 PECASE Award (Presidential Early Career Award for Scientists and Engineers). She is a Fellow of IEEE, selected for her contributions to distributed and heterogeneous multi-robot systems.

She is presently the Division Director for the Information and Intelligent Systems (IIS) Division in the Computer Science and Information Science and Engineering (CISE) Directorate at NSF.



Dr. Hairong Qi is the Gonzalez Family Professor with the Department of Electrical Engineering and Computer Science at the University of Tennessee, Knoxville. She is the first woman to hold an endowed position in the Tickle College of Engineering and was chosen, in part, because of her knowledge of image processing and computer vision.

Dr. Qi received the B.S. and M.S. degrees in Computer Science from Northern JiaoTong University, Beijing, China in 1992 and 1995 respectively, and the Ph.D. degree in Computer Engineering from North Carolina State University, Raleigh, in 1999.

Dr. Qi has won numerous awards for research and papers, including the NSF CAREER Award, as well as awards from the National Science Foundation and the Institute of Electrical and Electronics Engineers. She also received the Best Paper Award at the 18th International Conference on Pattern Recognition and the 3rd ACM/IEEE International Conference on

Distributed Smart Cameras. She recently received the Highest Impact Paper from the IEEE Geoscience and Remote Sensing Society.

Her current research interests are in advanced imaging and collaborative processing in resource-constrained distributed environment, hyperspectral image analysis, and bioinformatics.



Dr. Xiaojie Shi is the newest female faculty member of EECS, having joined the faculty in 2016. A native of Suzhou, Anhui, China, Dr. Shi received her M.S. degree from Zhejiang University, Hangzhou, China, in 2011, and Ph.D. degree from the University of Tennessee, Knoxville, in 2015, both in electrical engineering. She currently works as a research assistant professor at the Center for Ultra-wide-area Resilient Electric Energy Transmission Networks (CURENT), The University of Tennessee, Knoxville.

She has been involved in multiple projects during her Ph.D. study, including hardware test-bed (HTB), modular multilevel converter (MMC) and multi-terminal HVDC, which are supported primarily by the Engineering Research Center Program of the National Science Foundation and the Department of Energy and the CURENT Industry Partnership Program.

Now she is working on a microgrid project funded by ARPA-E, developing a smart and open-source microgrid controller. Her research interests include microgrids, high power grid-connected converters, HVDC transmission systems, and integration of distributed energy resources.



Dr. Jinyuan "Stella" Sun received the B.S. degree in computer information systems from Beijing Information Technology Institute, China, in 2003, the M.S. degree in computer networks from Ryerson University, Canada, in 2005, and the Ph.D. degree in electrical and computer engineering from the University of Florida, in 2010.

She was a Network Test Developer at RuggedCom Inc., Ontario, Canada, 2005-2006. She joined UT as an Assistant Professor in 2010 and is now an Associate Professor in EECS.

Her research interests in cybersecurity include security and privacy in wired/wireless networks, critical application systems, smart grids, mobile systems and behavior-based authentication.

Current projects include privacy-preserving mHealth monitoring; behavior-based authentication; covert communications in wireless sensor networks; and privacy-preserving data sharing and vulnerability assessment for smart grids.



Since joining the UTK faculty in August 2004, **Dr. Jayne Wu** has been developing a research program, "Electromechanics for Nanobiotechnology," and establishing national and international prominence in the field for the University of Tennessee. She has received the NSF Career Award, ORAU Junior Faculty Award, Science Alliance and other grants to support this research program. Within two years, the program has expanded to seven graduate students (four Ph.D. students).

The group, aiming to lead and emphasizing on innovation,

has produced several of the world's first microfluidic devices: (1) the first electrokinetic (EK) micropump for bio/conductive fluids; (2) the first in-situ particle trap on microcantilevers; and (3) a biased AC electro-osmotic micropump. Two pending patents, one provisional patent and one disclosure have been filed through UTRF. UTK's pioneering contribution in this field is being recognized by the peers all over the world, and Dr. Wu has been frequently solicited for seminars on her electrokinetic research at UTK, both nationally and internationally.

Dr. Wu received her Ph.D. in Electrical Engineering from the University of Notre Dame in 2004.



Dr. Yan Xu is the Eastman Professor of Practice in the EECS Department and has broad working experience in power systems, including utilities, digital relay protection manufacturing, and electric train manufacturing in China after receiving her Bachelor's and Master degrees. She worked at Oak Ridge National Laboratory (ORNL) for more than 8 years since she received her Ph.D. in Electrical Engineering from the University of Tennessee in 2006.

Dr. Xu's areas of research interest include power systems and power electronics, including utility applications of power electronics, renewable energy integration, smart grid, microgrids, communication, control, protection, and energy management of power systems. She is a senior member of IEEE and a member of the IEEE Power and Energy Society, as well as the IEEE Power Electronics Society.

Focus On: CURENT

CURENT is a National Science Foundation (NSF) Engineering Research Center specializing in Power Systems and Power Electronics research. A collaboration between academia, industry and national laboratories, CURENT, the Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks, is jointly supported by NSF and the Department of Energy. Dr. Kevin Tomsovic, CTI Professor at the University of Tennessee, Knoxville, leads the center.

Now in its sixth year, CURENT is headquartered in the Min H. Kao Building with the Department of Engineering and Computer Science. This new \$37.5 million building opened in January 2012. CURENT utilizes over 16,000 sq. ft. and houses the Hardware Testbed, Large Scale Testbed, Visualization Room, EV Laboratory, FNet Lab, power systems laboratory, power electronics laboratory and the high power electronics laboratory as well as staff and faculty offices.

CURENT partners with three other domestic universities, sharing research and resources. These three institutions act as satellite campuses for CURENT with dedicated faculty members and students. The three partner institutions are:

- Northeastern University
- Rensselaer Polytechnic Institute
- Tuskegee University

Mission

CURENT's vision is for a nation-wide or continent-wide

transmission grid that is fully monitored and dynamically controlled in real-time for high efficiency, high reliability, low cost, better accommodation of renewable energy sources, full utilization of energy storage and accommodation of responsive load. The center strives to nurture a new generation of electric power and energy systems engineering leaders with global perspectives and diverse back-



grounds.

One of the most important and pressing technical challenges over the next several decades is the question of how to address societal energy needs without a heavy reliance on fossil fuels. Less appreciated is the critical role that the electric power system transmission infrastructure plays in any viable solution. Most renewable resources are located far from population centers or have characteristics that make operation on a local basis difficult, e.g., daily cycles that correlate poorly with local demand. Moreover, one of the potentially most

effective ways to reduce our societal carbon footprint is to shift transportation load to the power grid through plug-in hybrid or all-electric vehicles. This, along with the retirement of coal-fired generation plants, requires development of new generation capacity, much of which will be located remotely.

While there has been a recent consumer level focus for greater demand control through

approaches such as smart metering, the core challenges of grid operation - control of an extremely large, complex electric network with tens of thousands of transmission lines, buses, and potentially millions of control points - remains unaddressed. CURENT is addressing these challenges by conducting fundamental research in the control

of interconnection-wide dynamics and in the

management of resources across vast geographical distances, widely varying timescales and diverse production sizes.

Research at CURENT focuses on:

- Developing new technologies to utilize advancements in power grid wide-area measurement and communication to allow coordinated action on a continental ultra-wide scale.
- Redesigning the control and information structure so it is less hierarchical and can replace, at all levels of the power grid, traditional inflexible operations strategies and facilitate the integra-

tion of intermittent renewables.

- Leveraging today's high performance computing capability to realize large-scale and faster than real-time dynamic simulation for predictive control (and fast response) to ensure secure and reliable operation.
- Incorporating high-speed power electronics based controllers to allow the full use of generation and transmission assets across an interconnected system.
- Developing advanced power electronic interfaces with wind and solar farms and bulk energy storage and associated controls for high penetration of renewable resources.

Twelve UTK faculty participate in CURENT. They are Dr. Kevin Tomsovic, Center Director; Dr. Yilu Liu, Deputy Director and Tennessee Governor's Chair; Dr. Fred Wang, Technical Director; Dr. Fangxing (Fran) Li, UTK Campus Director; Dr. Leon Tolbert, Thrust Leader and Department Head; Dr. Chen-fei Chen, Director of Education and Diversity; Dr. Daniel Costinett, Assistant Professor and Co-Director of Education and Diversity; Dr. Kai Sun, Assistant Professor; Dr. Stella Sun, Associate Professor; Dr. Hector Pulgar, Assistant Professor; Dr. Jian Huang, Professor; and Dr. Hairong Qi, Professor.

Industry

Industry Partners are integral to CURENT's research program. The Center links engineering research to technological innovation through sustained partnerships with industry. This close collaboration helps stimulate technology transfer into commercial products and start-up

companies.

Membership in CURENT provides Industry Partners with opportunities for collaboration in research, education programs and product development. Industry Partners are intimately involved in research plans through the discussion of engineering problems with faculty, staff and students. Membership benefits include, but are not limited to, the following:

- Ability to leverage NSF/DOE funding and influence the Center



research and education directions.

- Interaction with a cross-disciplinary pool of experts.
- Entrance to annual Center conferences and periodic web-based seminars for early dissemination of research outcomes.
- Opportunity to network and exchange ideas with other industry members.
- Preferential intellectual property rights.
- Access to interns with a specialty in power systems and power electronics.
- Invitations to presentations and workshops given by industry leaders and research experts.

Selected Industrial Partner representatives serve as members of the Industrial Advisory

Board (IAB) that advises the Center on strategic plans, research projects, research implementation, annual funding and other resource allocations for CURENT and its research thrusts. An annual Industry Day provides updates on CURENT research, as well as presentations and updates by respected professionals in the power industry. Industry partners also have the opportunity to work with student interns, undergraduate and graduate, who have chosen power systems and

power electronics as their specialty, many of whom have expertise in the Industry Partners' core products and research. As of June 2016, a total of 33 industry members have signed CURENT Industrial Partnership Agreements, up from 18 just three years ago. CURENT has four staff members dedicated to the development of industry relationships. They are Tom

King, Director of Innovation and Industry; Lisa Beard, Industry Outreach Director; Bill Giewont, Industry Technovator; and Brad Trento, Industrial Liaison Officer.

Education and Outreach

The education and outreach program supports the center's strategic plan by cultivating students' creativity and innovation. Programs are designed to enhance students' adaptability and to enable them to thrive in a global environment.

The CURENT education team has established the following objectives to enhance students' academic experience:

- Create programs that increase the participation of domestic students, women, and underrep-

resented minority students;

- Design a multi-disciplinary curriculum focused on electrical energy transmission system analysis and problem-solving skills;
- Develop connectivity with industry, partner institutions, and the larger power and energy system community; and
- Introduce pre-college and undergraduate students to the possibility of pursuing careers in engineering.

CURRENT offers several programs for both pre-college and university students.

These programs run throughout the year and offer participants a variety of learning and research experiences. Over the past few years, CURRENT has seen over 5,000 students and parents annually through its K-12 outreach events, while the undergraduate research program has mentored over 50 undergraduates from ERC institutions and 10 undergraduates from non-ERC Institutions per year.

Pre-college Program

- **RET (Research Experience for Teachers)-** This program is designed for middle school and high school science and math teachers. Over the course of four weeks, they develop curriculum for their classrooms related to electricity and the power grid. Each year CURRENT works with six to ten teachers from Knox County and Sevier County.
- **YSP (Young Scholars Program)-** This program consists mostly of rising juniors and seniors in high school who are excelling in STEM courses and who are interested in pursuing engineering careers. The program is

four weeks long and CURRENT hosts 10-20 students each summer. These students work with graduate student mentors to complete engineering projects related to current ongoing research projects.

- **Engineering Nights-** An after school program for elementary and middle school students. This is a fair-like event that takes place in the early evening for two to three hours. Students do brief, simple engineering activities with their families, teachers and UTK students. Most events



Ph.D. student Yalong Li monitors a multiterminal HVDC hardware testbed.

have between 150-300 attendees.

- Other middle and high school summer programs
- Ongoing lab tours and field trips

University Program

- **REU (Research Experience for Undergraduates)-** Research project for undergraduates that can be experienced as an 8-week summer program or as an academic year program.
- **Ambassador Group-** An undergraduate organization that performs research and outreach, and participates in center activities.

- **Undergraduate concentration-** Undergraduates can take concentration classes in electronics, renewables, power systems or other power related fields.

- **Senior research projects-** Senior level undergraduates can do research to investigate their interests.

- **Graduate certificate and fellowships-** CURRENT has a broad offering of funded opportunities for graduate students.

- **Student Leadership Council-** A student group that provides mentorship to CURRENT students and helps with visiting scholars and big events.

Two faculty members and one staff member facilitate education and outreach. They are Dr. Chen-fei Chen, Director of Education and Diversity; Dr. Daniel Costinett, Assistant Professor and Co-Director of Education and Diversity; and Mr. Erin Wills, Education Coordinator.

Visit the CURRENT website at current.utk.edu.



Bodenheimer Fellowship Expands Legacy

Dr. Robert Bodenheimer is an emeritus professor at the University of Tennessee, having served actively for nearly 40 years in the Department of Electrical Engineering. A Knoxville native, He received both his B.S. and M.S. in Electrical Engineering from the University of Tennessee, initially joined the UT faculty in 1957, but then took a leave in 1961 to obtain his Ph.D. from Northwestern University. While at Northwestern, he served on that faculty for two years and then returned to UT full-time in 1964.

Attending a series of "Career Night" events as a student at Knoxville's Young High School helped lead him to the field of engineering. "Professionals from different walks of life talked about their careers. My strongest subject area was mathematics. So, each year I was attracted to the engineering sessions. I knew by my third year that I wanted to be an engineer. A childhood fascination with radio caused me to select electrical engineering. As it turned out, this was a good choice," Dr. Bodenheimer said.

The University of Tennessee was his first and really his only choice for college. "By the time I was 10 years old, I was a Tennessee Vol fan. My father was an avid fan. He taught me about football and we would listen to the radio broadcasts together. I knew there were other universities, but there was never a serious consideration of going anywhere but UT," said Dr. Bodenheimer.

Dr. Bodenheimer has also worked for the Knoxville Utilities Board, Foote Mineral Company and ORTEC. At the University of



Dr. Robert E. Bodenheimer

Tennessee, he held every faculty position: instructor, assistant professor, associate professor, and was named full professor in 1973. Upon his retirement in 1998, he was named Professor Emeritus, a status reserved for the most revered faculty.

Although he did his doctoral work in control systems, Dr. Bodenheimer's areas of interest at the University of Tennessee were in digital systems and digital systems hardware. In 1959, he taught the first digital computer programming course at the University, using an LGP-30, an early 31 bit word computer with a 4096 word drum memory.

A passionate educator, he developed the digital systems initiative in Electrical Engineering at both the graduate and undergraduate levels, concentrating on using Boolean algebra in design, digital-analog conversion, and analog-digital conversion.

Later, his concentration was on microprogram control, microprocessor design, and using both in instrumentation and control applications.

His research in computer design, digital instrumentation especially for biomedical applications, and data/information processing led the way for UT's early expansion into computer applications. Dr. Bodenheimer was far ahead of his time, recognizing the vast potential for computers to transform the way we use data and process information.

"To describe what I consider my greatest accomplishment at UT, I need to start at the beginning of the story. That has to be teaching the first computer programming course at the University in 1959, using the LGP-30. I had absolutely no experience with computers. Starting with a programming manual, the real question was 'What can we do with this computer?' At this time, the College of Engineering was teaching incoming freshman how to use a slide rule and a book of mathematical tables to complete their computations. One of our first applications was to show that those tools could eventually be replaced. Students had success completing tasks that folks today take for granted; just tap an icon. That was a fun time.

"When I returned from Northwestern in 1964, my interest was in digital control systems. As the department had no option for the design of digital systems, I changed fields. So, my greatest contribution was the development of a curriculum and a laboratory for design of digital systems at both the undergraduate and graduate levels."

It is as a teacher and scholar

that Dr. Bodenheimer is applauded by the students who benefited from his brilliant mind and dedicated teaching. It was to honor Dr. Bodenheimer and to encourage bright graduate students to remain at the University of Tennessee that Mike Crabtree (BS '73, MS '75) created the Robert E. Bodenheimer Graduate Fellowship in 1989.

Dr. Bodenheimer recalled, "Mike told me he was planning to make a donation to the University and wondered how it could best benefit the EE Department. I don't remember any hesitancy on my part in suggesting that it be used for graduate student assistance. Little did I know that his intention was to endow a fellowship in my honor. In large public universities, one will not find many scholarships and fellowships endowed with other than the donor's name. The fact that Mike Crabtree endowed a fellowship in my name was a very humbling experience. Certainly this was the high water mark of my career."

Mr. Crabtree said of Dr. Bodenheimer, "Number one, he taught us practical things that could be used in industry. And he backed that up by spending at least a day a week working in industry and seeing what the real life problems were. The second thing that was so effective about Dr. Bodenheimer was he engendered camaraderie from his students by talking about things that a lot of us were interested in, like UT football games. He would spend a little time with us just talking about that and so, you knew that he was a real person and he was just like one of us. He



Bodenheimer Fellowship recipients Aaron Young, Kyle Harris, Jessica Boles, John Duggan and Adam Disney

had a lot more experience, a lot more education, imparting and mentoring that to us. The third thing I'd say is- because this was a time of very rapid change in technology, he always was keeping in touch with the latest technology trends and theory, but also practical projects that we were to do in class. He kept us up-to-date on very relevant, new technologies that we were going to be required to use and would be important for careers afterwards.

Selected accolades and awards for Dr. Robert Bodenheimer:

- *IEEE Region 3 Outstanding Educator Award, 1985*
- *L. R. Hesler Award for Excellence in Teaching and Service, 1990-1991*
- *Hoechst Celanese Corp. Teaching and Research Award, 1992-1993*
- *Tau Beta Pi*
- *Eta Kappa Nu*
- *Phi Kappa Phi*
- *Walter P. Murphy Fellowship (Northwestern University)*
- *Tennessee Eastman Senior Scholarship*
- *UT Freshman Scholarship*

"I always remembered him, and when I got the opportunity to be able to do something and saw the need in the department and in the College of Engineering, I wanted to give back. Dr. Bodenheimer was pivotal in not only me getting my graduate degree, but also introducing me to my future partners and vocation in the PET scanner business, and then CTI Molecular Imaging, which became very successful. If

Dr. Bodenheimer had not played his part, then who knows what I would have been doing?

"Dr. Bodenheimer really embodies the principles you'd like to see in a university professor, trying to do his best job to give his students the tools to help them be successful in life and in their careers."

Since its inception the Bodenheimer Fellowship has given \$600,000 in awards to 31 graduate students in the Department of Electrical Engineering and Computer Science. Today, each recipient receives a \$10,000 stipend that combines with a tuition waiver and a teaching or research assistantship, making the Bodenheimer Fellowship a significant tool for recruiting some of the best minds to stay at the University of Tennessee. Each year the scholarship selection committee reviews candidates' applications, and each year the number of qualified candidates has grown. Dr. Bodenheimer said, "Being a member of the selection committee has been an enjoyable privilege. I have been amazed with the quality of students applying for the fellowship."

Currently 7 students receive Bodenheimer Fellowships, but the goal is to double that number by raising an additional

Continued on page 18

2016 NSF Career Award Winners

Dr. Wei Gao, Dr. Kai Sun, Dr. Donatello Materassi



Dr. Wei Gao, assistant professor in the Department of Electrical Engineering and Computer Science, has received a National Science Foundation CAREER award for his proposal, “Inter-connected Mobile Computing in Wireless Networks.” The award will provide funding over the next five years for Dr. Gao to research multiple mobile devices, interconnected via wireless networks, complementing each other via cooperative resource sharing.

Mobile computing has become an indispensable part of life. Ideally, a mobile device should have powerful capabilities in computation, communication and sensing, an everlasting battery lifetime and a wearable form factor, so as to be used anytime and anywhere. However in reality, various manufacturing limits make it infeasible to realize this objective, and tradeoffs must be made.

Many devices are only suit-

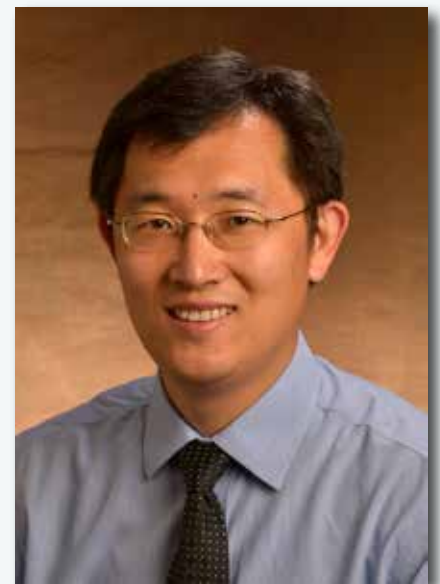
ed for a specific scenario, and a user has to switch between devices for different applications. Further, the increasing complexity of mobile computing tasks may exceed the capability of any individual device, imposing a hard limit on the scalability of mobile computing systems.

The driving vision of this CAREER proposal is a fundamental shift: instead of being separately operated, multiple devices owned by one user should be fully interconnected by wireless networks, so they can complement each other via cooperative sharing of their hardware and software system resources. For example, when a user gets into a smart vehicle, his smartphone and smartwatch could automatically discover and obtain GPS reception from the vehicle to save local battery.

IMC aims to fundamentally remove the physical boundary between mobile devices via network-wide interaction and seamless integration among mobile systems, and significantly augment the mobile computing capability provided to the user.

In this proposal, he plans to develop new technologies in wireless networks and mobile systems that are vital to realizing the vision of IMC. These technologies and engineering systems will be general and applicable to the entire spectrum of mobile devices, ranging from computational RFIDs and implantable medical devices, to smartphones and smart home appliances. Further, the success of this CAREER project will be

a key enabler of Dr. Gao’s long-term career goal, to fully unleash the potential of heterogeneous mobile devices for integrating highly pervasive and cognitive mobile applications and services into every aspect of people’s daily lives. It will also help connect Dr. Gao’s research to his long-term education goal of inspiring innovation of students and young workforces, by enabling a unique education and outreach facility on hands-on designs of wireless network and mobile computing systems.



Dr. Kai Sun, assistant professor in the Department of Electrical Engineering and Computer Science, has received the National Science Foundation (NSF) CAREER Award for his proposal, “Integrated Research and Education in Nonlinear Modal Decoupling and Control for Resilient Interconnected Power Systems.” The award will provide \$500,000 over a five-year period for Dr. Sun to establish a new

methodology for power system stability analysis and control based on understanding, decoupling and control of nonlinear modal dynamics. The outcomes of the project are expected to create broad impacts on both the power industry and the research community in interconnected power systems and other networked dynamic systems.



Dr. Donatello Materassi, assistant professor in the Department of Electrical Engineering and Computer Science, received the National Science Foundation (NSF) CAREER Award for his proposal, "Design of In-line Controllers for Continuously Operating Networks with Structural Uncertainty." The award will provide \$500,000 over a five-year period for Materassi to conduct research on designing control mechanisms for a networked system with unknown structure by making use only of non-invasive observations. His research will have impact on many systems and areas such as large networks (the power grid, logistic systems, financial systems) as well as in applications in the medical field.

Bodenheimer Fellowship Expands Legacy

Continued from page 16

\$1,000,000 for the endowment. Mike Crabtree has committed to a lead gift of \$250,000. Crabtree said, "Typically we award somewhere between two and four new recipients a year. And this last selection process, we had so many really good, viable candidates, and we just didn't have enough money to give to them all. That was one of the reasons why I decided to make an additional investment, and why we decided it was a good time to start a campaign to try to increase the endowment of the principal of the fellowship, and so we could accommodate more deserving students. All of them are very bright, and a lot of them really couldn't go to graduate school without getting financial assistance."

Some of the 2016-2017 Robert E. Bodenheimer Fellows echo that sentiment:



"When thinking about graduate school, the Bodenheimer Fellowship made the decision to stay at the university an easy one. I had already wanted to stay at the university as I had a professor I wished to work with, and the fellowship removed any financial concerns I had about staying in school."
John Duggan



"The Robert E. Bodenheimer Fellowship is letting me focus on this computer engineering research while pursuing my master's degree, without being financially dependent on my parents or having to seek additional employment."
Aaron Young



"I doubt that I would be going to graduate school without the Robert E. Bodenheimer Fellowship. Financially, I don't think it would have been possible."
Adam Disney

Dr. Bodenheimer has still maintained a connection to teaching. "I started tutoring algebra in 1949 when I was a student at Young High School. That has continued throughout my career. In recent years I have tutored math as part of the Care and Kindness Ministry of my Church. Last school year, I tutored 4 students from 4 different high school in Knox and Blount counties."

"I do have a principle that I have followed most of my life from about the fourth grade. That principle is to do the very best job I can to whatever task I have committed. One may not achieve exactly what one wants; but, when one's best shot was given, one doesn't have to apologize for the result. That principle has served me well, as a student and as a teacher. Whether receiving or giving, I was always prepared for class. I only hope that approach became apparent to the students I had in class. Perhaps, that might qualify as a philosophy—always do your very best."

Dr. Bodenheimer currently resides in South Knoxville on a "gentleman's farm" with his wife Sally.

Power Electronics Research at UT

You can thank engineers in the field of Power Electronics for developments and improvements in a wide range of areas, from medical devices to renewable energy, from cell phone chargers to aerospace applications, and more.

Power electronics is the study of the design, construction, and use of circuits to convert or condition electricity. The use of power electronics is prolific in modern society. Laptop chargers, computer power supplies, solar photovoltaic systems, electric vehicle powertrains, audio amplifiers, and cardiac pacemakers are just a few examples of applications requiring high performance power electronics.

The field of power electronics is ripe with opportunities. New technology is being developed at a rapid pace, the industry is expanding, and research projects are in progress that have the ability to change the way the power industry operates today. For power electronics students, this means the chance to participate in very important and exciting avenues of study.

The University of Tennessee's Electrical Engineering and Computer Science Department has

several active research projects in five major application areas: Electric Vehicles and Aerospace, Renewable Energy and Energy Storage, Utility Applications, and Medical Devices and Power Supplies.

Electric Vehicles and Aerospace

- SiC-Based Reconfigurable DC-DC Converter Design for Electric Vehicles (EVs) Charging and Powertrain Application.
- Comprehensive Design and Operation Paradigm for WBG-Based Converters
- Intelligent Gate Drive for Maximizing Performance and Enhancing Reliability of Wide Bandgap Semiconductors
- Ultra-light Highly Efficient MW-Class Cryogenically Cooled Inverter for Future Electric Aircraft
- WBG-based Power Module for EV Traction Drives

Renewable Energy and Energy Storage

- GaN-based Inverter for Photovoltaic Applications
- Grid Integration of Renewable Energy Sources
- Google Little Box Challenge Inverter
- WBG-based 20 kW dc-dc converter for interfacing solar ener-

gy with the hardware testbed.

- Medium-voltage Inverter for PV Direct Connection to Grid

Utility Applications

- High voltage direct current (HVDC) transmission
- A Smart and Flexible Microgrid with a Low-cost Scalable Open-source Controller
- DC Controller for Continuously Variable Series Reactors (CVSRs)
- Reconfigurable Grid Emulator Hardware Testbed
- Multilevel converters

Medical Devices

- Electrosurgical Power Supply with Harmonic Control and Component Integration
- RF Wireless Energy Harvesting

Power Supplies

- Multi-load Multi-frequency Wireless Power Transfer
- Increasing Power Density of Inductors using Electropermanent Magnets
- GaN-based AC/RF Converter Design for Wireless Power Transfer
- Automated Device Analysis and Converter Design
- Development of Ultra-High Efficiency, High-Density Data

Center Power Supplies

CURRENT, the Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks, is one of five National Science Foundation (NSF) Engineering Research Centers (ERC) focused on energy and infrastructure. It is the result of a collaboration between academia, industry and national laboratories and is jointly supported by NSF and the U.S. Department of Energy (DOE). The center itself is a partnership of four research institutions led by the University of Tennessee in Knoxville, TN (UTK) and includes Northeastern University, Rensselaer Polytechnic Institute, and Tuskegee University.

The three professors who lead UT's power electronics program are Min Kao Professor Dr. Leon Tolbert, Condra Chair of Excellence Dr. Fred Wang and Assistant Professor Dr. Daniel Costinett.

In terms of power electron-

The power electronics group works with a variety of government and industry sponsors, including Oak Ridge National Laboratory, Boeing, Intel, Texas Instruments, Global Power Electronics, General Electric, ABB, Danfoss and Delphi, to devel-



op next-generation prototype power electronic converters for a variety of applications.

In 2015, the U.S. Department of Energy granted \$2.9 million to the University of Tennessee for a new graduate traineeship called PoTenntial. UT will use it to encourage more students to go to graduate school for Power Electronics. PoTenntial is a design-oriented, hands-on graduate degree program focusing on the use of wide bandgap (WBG) semiconductors in power electronics. Traineeships are available for Masters or Doctoral-level studies. All students accepted into the program will receive a full waiver of tuition, and a \$30,000 yearly stipend during their studies.

The WBG traineeship certificate is granted to students who have demonstrated mastery of knowledge in WBG power electronics, and preparation for industry or academic positions

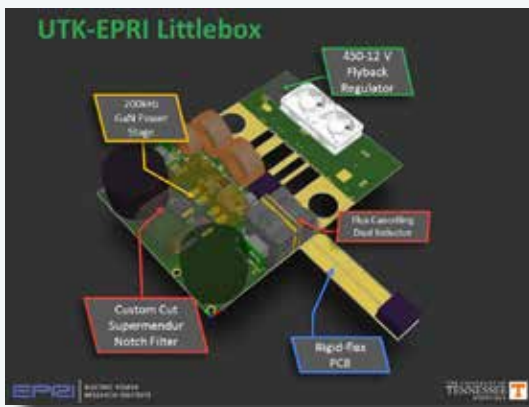
as a leader in the field.

The program emphasizes hands-on, design-oriented education. Each trainee will build and test real converters using wide bandgap devices, typically silicon carbide or gallium nitride, in their coursework and in their research.

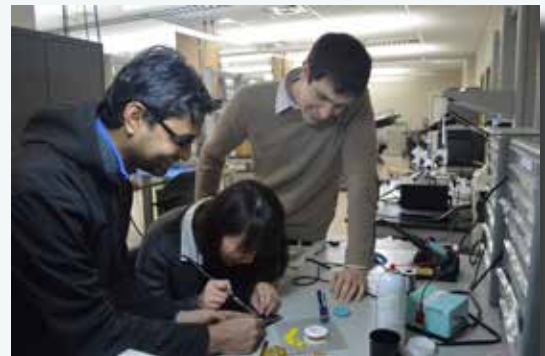
In September 2016, members of the US Department of Energy visited the University of Tennessee Knoxville to review the newly-formed PoTenntial traineeship program. This visit represented an "opening ceremonies" of sorts for the PoTenntial traineeship, which had its first semester of students arrive in August for the Fall semester. A

cohort of 11 US citizen graduate students from around the nation have begun to pursue their MS or PhD degrees in power electronics with an emphasis in wide bandgap technologies in PoTenntial.

During the visit, representatives from DOE emphasized the necessity to continue innovation in power electronics in the presence of a revolution in device technologies.



ics research, CURRENT presently has 30 Ph.D. students, 11 M.S. students, four visiting Ph.D. students, two visiting scholars, three post docs, and ten undergraduates.



Fresh Faces: Dr. Max Schuchard & Dr. Stephen Marz



Dr. Max Schuchard is originally from South Dakota, and he earned his BS in Computer Science at the University of Minnesota in 2007. After receiving his bachelor's, he worked for two years with EPIC Systems, an electronic medical records company in Madison, Wisconsin doing research and development. He subsequently returned to the University of Minnesota for his Ph.D., again in Computer Science, completing it in June 2016. While he was a Ph.D. student he worked with a small defense contracting firm in Minneapolis-St. Paul called Smart Information Flow Technologies (SIFT). He says the coolest thing he did there was participate in DARPA's Cyber Grand Challenge, which was a competition to build software which would autonomously find vulnerabilities in other pieces of software, demonstrate the vulnerability, and then generate a patch for it, all without human intervention. He has now come to the University of Tennessee as an assistant professor.

Dr. Schuchard researches computer security and privacy. His research covers many specific areas, but in general it looks at both how adversaries can disrupt a broad range of computer systems tasked with delivering your data and what privacy concerns there are when adversaries play games with those systems in order to learn more about the people using them.

His thesis centered around the security of the Internet's routing infrastructure- the computers that glue together the Internet, helping your data get from you to its destination. Specifically, it looked at how an adversary who wanted to disrupt large portions of the Internet could attack routers which speak the Border Gateway Protocol (BGP) to each other.

Dr. Schuchard also asks similar questions about censorship circumvention systems. These are systems that help individuals, living in nations where authorities restrict what content can be accessed, achieve free and unfettered access to the Internet. His research approaches these systems from the perspective of a censoring entity, looking for ways that the systems can be disrupted, or worse yet, their users unmasked and identified. The goal is to find such flaws in the systems before repressive nation-states do and fix them, resulting in more robust systems and a higher degree of safety for their users.

Lastly, Dr. Schuchard researches crypto-currencies such as Bitcoin, Ethereum, and ZCash. He is mostly interested in the privacy implications of such systems, but he also works to try to understand how the exchange markets of these systems behave, or don't behave, in many instances.



Dr. Stephen Marz is a Lecturer in the EECS department at the University of Tennessee. He received his Ph.D. degree in Computer Science from the University of Tennessee in 2016. His interests include operating systems for multiple computer architectures, programming languages, graphical user interfaces, and input event models. His teaching interests include using computer-aided technology to improve classroom learning environments and developing interesting, hands-on projects to accommodate assorted learning styles.

Before arriving at the University of Tennessee, Dr. Marz was a Captain in the US Air Force and served as a helicopter rescue pilot and instructor pilot, with several combat deployments. After retiring in 2012, he pursued an interest in higher-level education and teaching. He spent four years as a graduate teaching assistant in the EECS department at the University of Tennessee.

Industry Partners

Industry members that fund EECS research

Applied Nanotech	Hewlett Packard
Applied Research LLC	Honeywell
BAE Systems, Inc.	II-VI Foundation
Boeing Company	Intel Corporation
Catalyst Repository Systems	Intelligent Automation, Inc.
Chronos Tech	MaXentric Tech LLC
Covidien LP	Sloan Kettering Cancer Center
decibel Research	Morpho Detection, LLC
Eleon Energy, Inc.	Novell
eMIT, LLC	SAIC
GE Global Research	Semiconductor Research Corp.
General Motors Corp.	Texas Instruments, Inc.
GL PwrSolutions, Inc.	Volkswagen Group

Employers that are hiring EECS graduates

Accenture	Garmin	Proctor and Gamble
Adrenaline Inc.	General Dynamics	Red Hat Inc.
Aerospace Testing Alliance/Arnold Engineering Developing Complex	General Electric	Red Ventures
ALCOA	Georgia Pacific	SABIC
ARC	Gerdau Long Steel Knoxville	Sandia Labs
Asurion	Google	Schneider Electric
AT&T	Green Mountain Coffee Roasters	Science Applications International Corp. (SAIC)
BAE Systems, Inc.	Haskell Company	Scripps Networks
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Boeing Company	Intergraph	Siemens Molecular Imaging
Bridgestone Manufacturing Co.	International Paper	SL-TN
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Caterpillar Financial	Kimberly-Clark	Tesla
Cerner Corporation	Knoxville Utility Board	Texas Instruments
Cisco Systems	L3 Communications	Textron Aviation
Clayton Homes	Logan Aluminum	Time Warner Cable
Clean Air Engineering	Mahle	United States Air Force
CNS Y-11	Maryville City Schools	United States Navy
Colgate Palmolive	Memphis Light, Gas and Water	UnitedHealth Group
Collider Inc.	Motorola Solutions	University of Tennessee
Dennis Group, LLC	MPI	University of Tennessee Health Science Center
DENSO Manufacturing	NASA Johnson Space Center	US Smokeless Tobacco
DPRA	Nissan	Vacuum Technology Inc.
Duke Energy	Norfolk Southern	Volkswagen
Eastman Chemical Company	Nutanix	Walmart
Eaton Corporation	Oak Ridge National Laboratory (ORNL)	White Stone Group, The
Electric Power Research Institute (EPRI)	OpenText	Y-12 National Security Complex
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General Electric Company, *Fairfield, CT*
Grid Protection Alliance, Inc., *Chattanooga, TN*
Hitachi America, Ltd., *Santa Clara, CA*
Huawei Technologies USA, *Plano, TX*
ISO New England, *Holyoke, MA*
Keysight, *Santa Rosa, CA*
New York ISO, *Rensselaer, NY*
Lawrence Livermore National Laboratory, *Livermore, CA*
Mehta Tech Inc., *Eldridge, IA*
The Mitre Corporation®, *McLean, VA*
National Instruments Corporation, *Austin, TX*
National Rural Electric Cooperative Association, *Arlington, VA*
National Renewable Energy Laboratory, *Golden, CO*
Oak Ridge National Laboratory, *Oak Ridge, TN*
Opal-RT Technologies, *Montréal, Québec, Canada*
OSIsoft, *San Leandro, CA*
Pacific Northwest National Laboratory (PNNL), *Richland, Washington*
Peak Reliability, *Vancouver, Washington*
PJM, *Philadelphia, PA*
PowerMetrix, *Knoxville, TN*
Southern Company, *Atlanta, GA*
State Grid, GEIRI North America, *Santa Clara, CA*
Tektronix, *Beaverton, OR*
Tennessee Valley Authority, *Chattanooga, TN*
VR Energy, *Los Angeles, California*

Department Profile

Our Mission:

- To prepare students for entry into the profession;
- To instill in students the capabilities required by the discipline, the recognition of the need to enhance the discipline, and the desire for lifelong learning; and
- To equip students with a general knowledge and/or research capabilities in technical and non-technical disciplines so that they are prepared for further study and contribution in other fields, including professional and graduate education.

Our Vision:

We are resolved to become one of the country's top public EECS departments. To bring this vision to reality, the department is committed to these six charges:

- Attaining national and international recognition among peer institutions for excellence in both research and teaching.
- Assembling a dynamic body of faculty who exemplify excellence and innovation in the pursuit and delivery of knowledge, and will perpetuate the highest standards of education in EE, CE, and CS.
- Graduating students who are well-educated in technical knowledge, who have solid communication and teamwork skills, and who can compete successfully in the global business and research world.
- Maintaining technical relevance in response to scientific and engineering advances, and the evolving student body.
- Investing strategically in the college's most important resources — students, faculty, and programs — through the vigorous acquisition of grant and contract funding from agencies, corporations, and foundations.
- Partnering with academic, industrial, and government entities that share and enhance the mission of the department so that our educational, research, and collaborative efforts result in the maximum positive economic impact locally, regionally, nationally, and globally.

Departmental Scholarships 2016-2017

Carol and Malcom Bayless Scholarship

Hollis Bui
Stephanie Kreutz
Alexander Teepe

Dr. Michael E. and Mrs. Jane N. Casey Scholarship

Carley Horton

Grace O. Davis Scholarship

Eric Auel

EECS Department Scholarship

Vasu Kalaria

Christopher J. and Michelle R. Gentry Scholarship

Michael Cauthen

S. T. Harris Scholarship

Tony Abston
Steven Engel
Thomas Jean
Nicholas Kelley
Zachery Miller

Urban and Susan Hilger Scholarship

Clarence Wong

Eta Kappa Nu (HNK) Beta Phi Chapter Scholarship

Kevin Ye

Dr. Eldredge Johnson and Mrs. Lynda Herndon Kennedy Scholarship

Kyle Goodrick

Robert and Alliene Lay Scholarship

Clarence Wong

W. O. Leffell Scholarship

Avie Desai
Edgardo Diez

Edgar Wyman McCall Scholarship

Dylan Hedrick

Harlan D. Mills Scholarship

Ardlan Khalili

Min H. Kao Scholarship

Chandler Bauder
Jared Baxter
Quillen Blalock
Samuel Brown
Grant Bruer
Isaiah Cash
Summer Church
Jacob Davis
Victoria Florence
Elliot Greenlee
James Hunter
Gerald Liso
Richard McEver
Luke Mills
John Mitchell
William Norton
Cody Orick
Samuel Rose
Dev Sharma
Tyler Stuessi
William Vaughan
Jerome Vaz
Sophie Wardick
Rachel Weeks
Sean Whalen
Andrew Wintenberg

Billy J. and Sylvia F. Moore Scholarship

Joshua Bolinsky
Kevin Carroll
Spencer Miller
Thomas Turner

Leonard B. Murray, Sr. Scholarship

Paxton Wills

Leonard B. Murray, Jr. Scholarship

Carley Horton

Erby Roy and Jean Bush Nankivell Scholarship

Adriano Santos Filho
Albert Toth

David O. and Joan G. Patterson Scholarship

Douglas Aaser

Leonard and Betty Shealy Scholarship

Jeremy Anantharaj
Daniel Barry
Daniel Enciso
Jordan Holland
Nicklaus Penley
Jackson Wood
Brandon Woodley
Kevin Ye

Charles and Martha Sprankle Scholarship

Ahmad Awad
Tyler Crafton
Joseph Diamond
Jeremy Herwig
Tanner Hobson
Aleksander Klibisz
Stephen Kwan
David Swanson
Matthew Taylor
James Tucker

David W. Straight Scholarship

Parker Tooley

Fred Smith Vreeland Scholarship

Sunay Bhat

Charles Weaver Scholarship

Sunay Bhat

Arthur F. Woods Scholarship

Eric Auel
James Bates
Mark Bolles
Sarah Glasgow
Daniel Sawyer
Taylor Short
Montie Smith
Joshua Storie
Michael Wallmarker
Paxton Wills

Departmental Fellowships 2016-2017

Bodenheimer Fellowship

Jessica Boles
Spencer Cochran
Adam Disney
John Duggan
Patricia Eckhart
Kyle Harris
Aaron Young

Chancellor's Award

Sherif Hassanein Amer
Gangotree Chakma
Mihaela Dimovska
Jeffery Dix
Saajid Al Haque
Munir Hasan
Ling Jiang
Ifana Mahbub
Taher Naderi
George Niemela
Farhan Quaiyum
John Reynolds
Firoozeh Sepehr
Aysha Shanta
Mst. Shamim Ara Shawkat
Joseph Teague
Abigail Till
Paige Williford
Kai Zhang

DOE Training Award

Doug Bouler
Spencer Cochran
Jacob Dyer
Jordan Gamble
Maeve Lawniczak
Daniel Merced Cirino
Mark Nakmali
Kamal Sabi
Jordan Sangid
Craig Timms
Paige Williford

Department Excellence Award

Md Musabbir Adnan
Qinglei Cao
Shengnan Chen
Kirsten Dawes
Yan Du
Wei Feng
Handong Gui
Ava Hedayatipour
Xingxuan Huang
Jiali Li
Jiangnan Li
Zhongbo Li
Sara Mousavicheshmehkaboodi
Jiahao Niu
Yasaman Rajaee
Sagarvarma Sayyaparaju
Samira Shamsir
Jingjing Sun
Tasmia Rahman Tumpa
Shuyao Wang
Weikang Wang
Xin Xu
Zhe Yang
Yu Zhao

ESPN Award

Alok Hota
Chongwen Zhao

J. Wallace & Katie Dean Graduate Fellowships

Samira Shamsir

Min H. Kao Fellowship Award

David Basford
Bo Liu
Ali Mohsin
Ali Taalimi
Bin Wang
Sisi Xiong

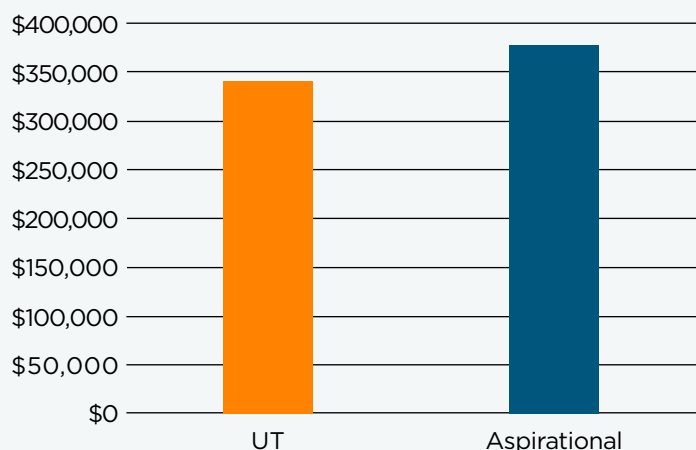
By the numbers

How EECS at UT compares to aspirational institutions

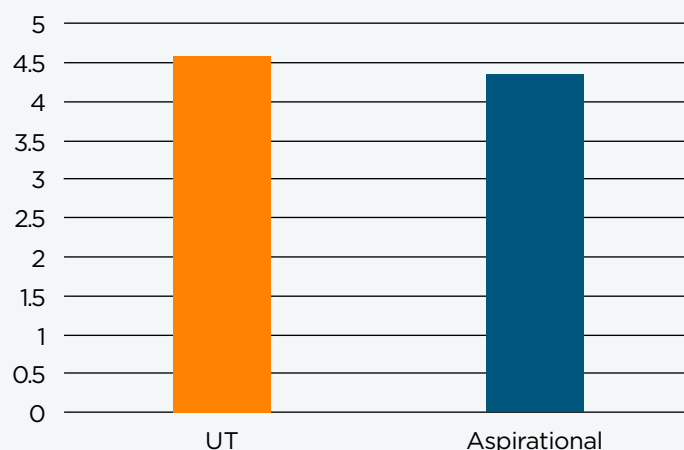
We've collected data from universities we consider aspirational peers over the past year to see how our EECS program compares. The data from our aspirational universities has been averaged and displayed in the following charts.

Our aspirational peers are: Maryland, Wisconsin, Penn State, Florida, North Carolina State, Colorado, California-Davis and Utah.

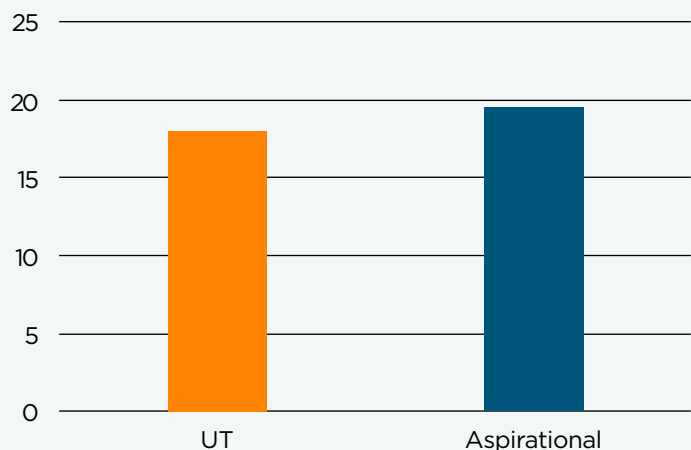
Research expenditures per T/TT faculty



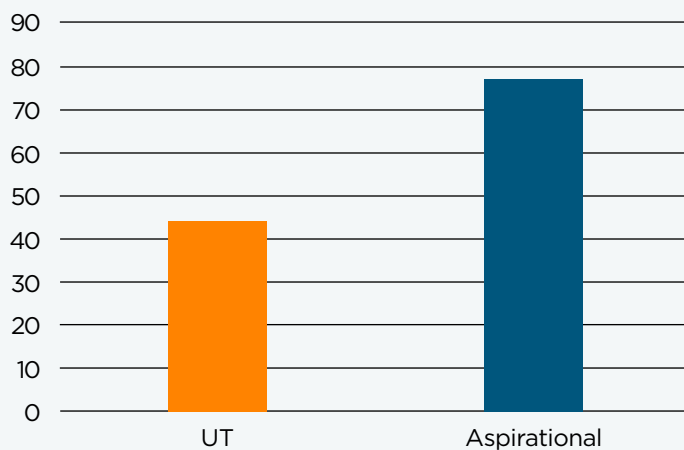
PhD enrollment per T/TT faculty



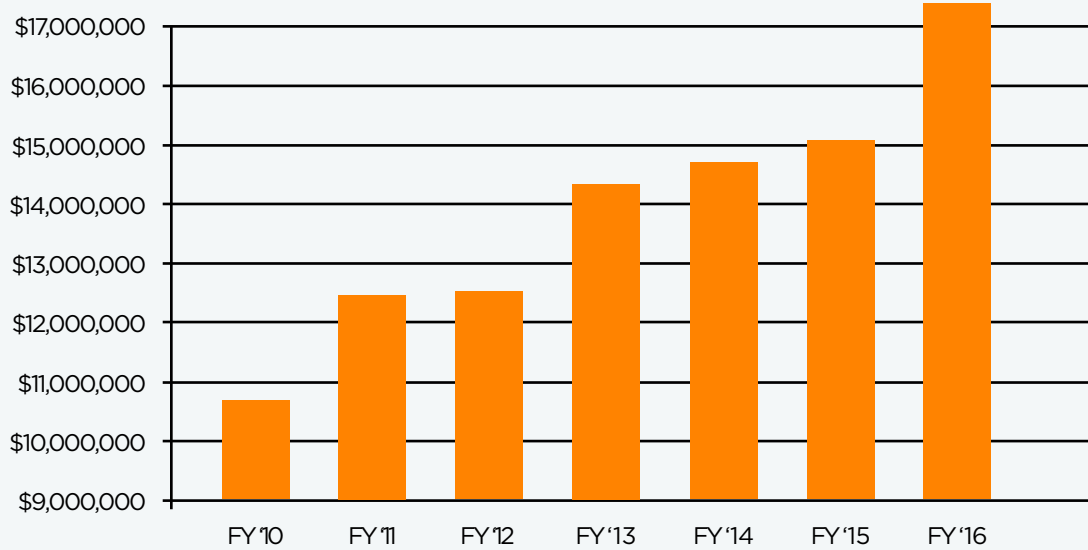
Undergraduate enrollment per T/TT faculty



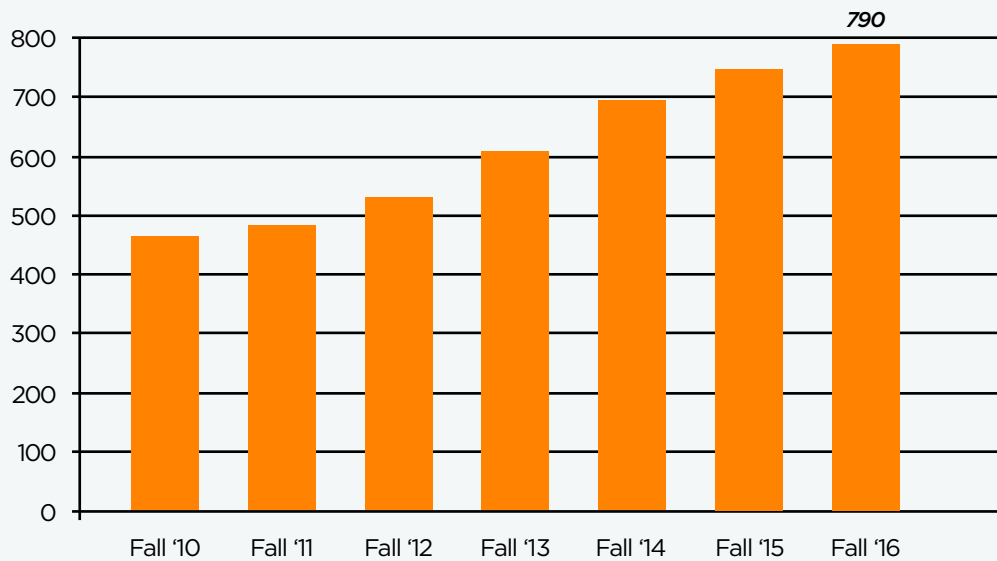
Number of T/TT faculty



EECS Research Expenditures



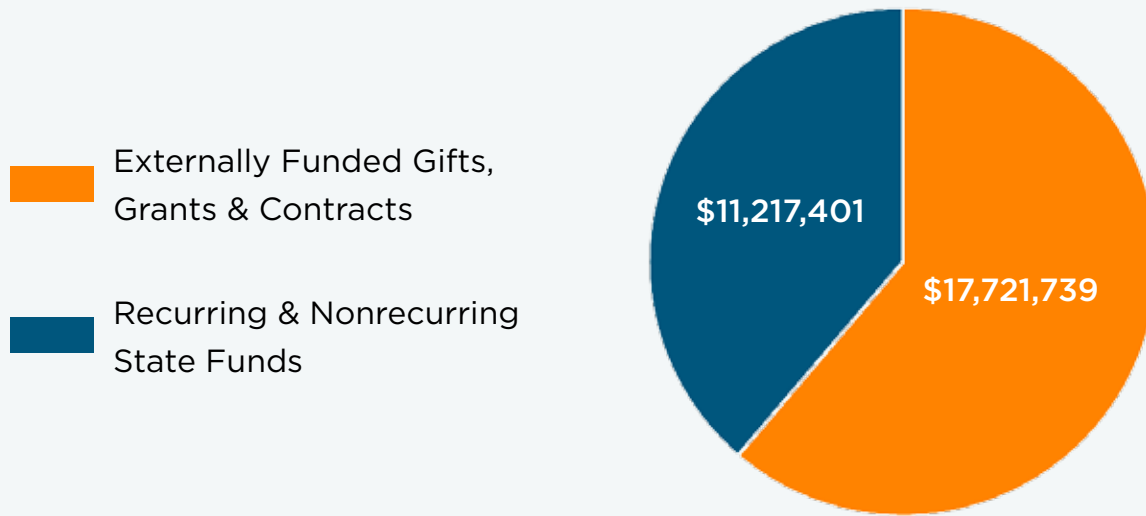
EECS Undergraduate Enrollment



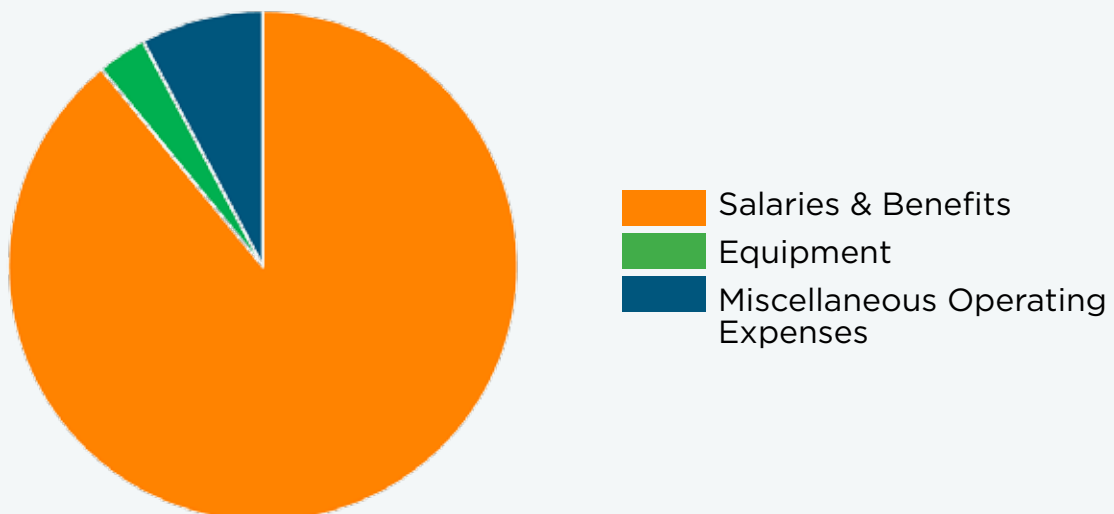
Financial Information

Numbers reflect the department's financial information for FY16.

Total Resources \$28,939,140



Expenditure Breakdown of State Funds \$11,217,401



EECS Faculty 2016-2017



Mongi Abidi
Ph.D. The University of Tennessee
Cook-Eversole Professor
Pattern recognition, image processing, robotics



Michael W. Berry
Ph.D. University of Illinois
Professor
Bioinformatics, information retrieval



Qing (Charles) Cao
Ph.D. University of Illinois
Associate Professor
Wireless and distributed sensor networks



Judy Day
Ph.D. University of Pittsburgh
Assistant Professor
Model predictive control, translational medicine



Seddik M. Djouadi
Ph.D. McGill University (Canada)
Professor
Automatic control, smart grid applications



Aly E. Fathy
Ph.D. Polytechnic Institute of New York
James W. McConnell Professor
Antennas and microwaves



Micah Beck
Ph.D. Cornell University
Associate Professor
Networks, distributed computing



Benjamin J. Blalock
Ph.D. Georgia Institute of Technology
Kennedy-Blalock-Pierce Professor
Analog and mixed-signal circuits



Daniel J. Costinett
Ph.D. University of Colorado
Assistant Professor
Power electronics, electric vehicles



Mark Edward Dean
Ph.D. Stanford University
Fisher Distinguished Professor
Neuromorphic computing, data center reliability



Jack Dongarra
Ph.D. University of New Mexico
University Distinguished Professor
High performance and scientific computing



Wei Gao
Ph.D. Pennsylvania State University
Assistant Professor
Embedded systems, sensor networks



Jens Gregor
Ph.D. University of Aalborg (Denmark)
Professor
Image processing, biomedical data visualization



Gong Gu
Ph.D. Princeton University
Associate Professor
Graphene, electronic materials



Jian Huang
Ph.D. The Ohio State University
Professor
Data analytics and visualization



David Icove, P.E.
Ph.D. The University of Tennessee
UL Professor of Practice
Fire protection and forensics



Syed Kamrul Islam
Ph.D. University of Connecticut
James W. McConnell Professor
Bio-electronics and sensors

Michael Jantz
Ph.D. University of Kansas
Assistant Professor
Software systems, compilers

Michael A. Langston
Ph.D. Texas A&M University
Professor
Bioinformatics, data analytics, graph theory

Fangxing (Fran) Li, P.E.
Ph.D. Virginia Tech
Associate Professor
Power systems modeling and economics

Husheng Li
Ph.D. Princeton University
Associate Professor
Wireless communications and networks

Yilu Liu
Ph.D. The Ohio State University
Governor's Chair Professor
Power systems monitoring and control





Bruce J. MacLennan
Ph.D. Purdue University
Associate Professor
Bio-inspired computation, artificial morphogenesis



Donatello Materassi
Ph. D. Università degli Studi di Firenze (Florence)
Assistant Professor
Stochastic systems, control and system identification



Audris Mockus
Ph.D. Carnegie Mellon University
Ericsson Harlan Mills Chair Professor
Data analytics, software engineering



Gregory D. Peterson
Ph.D. University of Washington (St. Louis)
Professor
High performance computer architectures



Hector Pulgar
Ph.D. University of Illinois at Urbana-Champaign
Assistant Professor
Power system dynamics and control



Garrett Rose
Ph.D. University of Virginia
Associate Professor
Memristors, Nanoelectronics, hardware security



Stephen Marz
Ph.D. University of Tennessee
Lecturer
Operating systems, programming languages



Nicole McFarlane
Ph.D. Maryland University
Assistant Professor
Bio-electronics, mixed signal circuits



Lynne E. Parker
Ph.D. Massachusetts Institute of Technology
Professor
Robotics, distributed intelligence



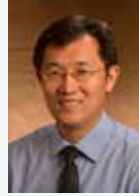
James S. Plank
Ph.D. Princeton University
Professor
Neuromorphic computing, data storage



Hairong Qi
Ph.D. North Carolina State University
Gonzalez Family Professor
Collaborative sensor signal and image processing



Max Schuchard
Ph.D. University of Minnesota
Assistant Professor
Computer security and privacy, censorship circumvention systems, crypto-currencies



Jinyuan (Stella) Sun
Ph.D. University of Florida
Assistant Professor
Cybersecurity, network privacy

Kai Sun
Ph.D. Tsinghua University (China)
Assistant Professor
Power system dynamics, stability, control



Chao Tian
Ph.D. Cornell University
Associate Professor
Data communication, information theory

Leon M. Tolbert, P.E.
Ph.D. Georgia Institute of Technology
Min H. Kao Professor
Power electronics, renewable energy



Kevin Tomsovic
Ph.D. Washington University
CTI Professor
Power system modeling and control

Bradley T. Vander Zanden
Ph.D. Cornell University
Professor
Graphic programming, instructional technology



Michael D. Vose
Ph.D. University of Texas
Associate Professor
Mathematical software

Fei (Fred) Wang
Ph.D. University of Southern California
Professor and Condra Chair of Excellence in Power Electronics
Power electronics, aerospace applications



Jie (Jayne) Wu
Ph.D. Notre Dame
Associate Professor
Bio-electronics, microfluidics, MEMs

Yan Xu
Ph.D. The University of Tennessee
Eastman Professor of Practice
Power systems, power electronics



Faculty Profile

EECS has 41 (for 2016-2017) full-time tenured and tenure-track faculty members who are all leaders in their fields. Each year they successfully compete for and receive prestigious awards and accolades. Their research and scholarship are not only helping keep the department on the cutting edge of its disciplines, but also teaching and training the engineers of tomorrow.

Strength Area

Tenured/Tenure-Track Faculty

Biological applications

Berry • Day • Islam
Langston • McFarlane
Peterson • Vose • Wu

Computer systems and architecture

Beck • Dean • Jantz
Mockus • Peterson • Plank
Rose • Vander Zanden

High performance and scientific computing

Berry • Dean • Dongarra
Gregor • Huang • Langston
Peterson • Vose

Intelligent systems, data mining, and machine learning

Berry • Gregor
MacLennan • Mockus
Parker • Qi • Vose

Microelectronics, microwave, and MEMS

Blalock • Fathy • Gu
Islam • McFarlane • Wu

Networked and embedded systems and cybersecurity

Beck • Cao • Djouadi
W. Gao • H. Li • Parker • Qi
Schuchard • J. Sun • Tian

Power systems, power electronics, and renewable energy

Costinett • F. Li • Liu
Pulgar • K. Sun • Tolbert
Tomsovic • F. Wang

Signal processing, systems, and controls

Djouadi • H. Li
Materassi • Qi

Visual computing and image processing

Abidi • Gregor • Huang
Qi • Vander Zanden

Undergraduate Graduates 2015-2016

Alwaleed Aldhafeeri
James Allen Allred
Abdulqader Ahmed Almami
Joshua Adam Beck
Natalie Rene Beitel
Muhammed Hussein Benkhayal
Jared Willis Bolin
Douglas Wayne Boulter, III
Carman Michael Bower
Shawn Stephen Bradford
Michael John Breuhl
Benjamin Acker Brock
William Andrew Brummette
Brandon Cagle
Alexander Bradley Chaloux
Richard Joseph Connor, III
Bradley Mercer Cook
Brennen Alexander Cox
Deepa Prakash Dave
Sharvari Sanjiv Desai
Kevin A. Dunn
Richard Hilker Fagan
Jamie Mitchell Finney
Simon Alexander Finney
Reed Matthew Foster
Jonathan Thomas Fox, Jr.
Xing Fu
Vasile Tudor Garbulet
Dustin Wyatt Gay
Scott Michael Giles
Timothy Ryan Goering
Daniel Alexander Graves
Justin Michael Gunnels
John Scott Gutman
William Henry Halsey
Jeffrey Hamilton
Gabriel Joseph Hanas
Saajid Al Haque
Blake Andrew Haugen
Roy Nathan Hays

Britt Foster Hendricks
Andrew L. Hnilica
Christopher Michael Holzmer
Kenneth Kai-Di Hsueh
Harry Norman Hughes, III
Thomas Joseph
Matthew Edward Kline
Julian Michael Kohann
Maeve Elise Lawniczak
Gavin Benjamin Long
Matthew Kelly Lutz
Tyler Eugene Marshall
Joseph Daniel Marshall
Garrett Reid Massman
Micah Mcquein Maze
Kyle Copeland McClanahan
Jason Adam Mcdonald
Andrew Kenneth Messing
Connor Christian Minton
Cody Shawn Mitchell
Robert Terry Moncrief, III
Nicholas S. Moran
Andrew Michael Nack
Andrew Keats Noyes
Michael A. Oberdiear
Benjamin David Parrott
Milan Patel
Zengyi Peng
David Berthelot Place
Paul Joseph Proctor
Benjamin James Ramsey
Christopher Michael Reardon
Jeremy Nelson Rogers
Ryan Bruce Roper
Jordan Michael Sangid
Adam Michael Seal
Garland Ben Shull, IV
Christopher Heath Skelton
Stephanie J. Steren-Ruta
Molly Anne Tague

Jalen Delance Tarvin
Joseph Townley Teague
Christopher Brian Tester, Jr.
Taylor Allen Thomas
Michael G. Trout
Bradley James Vincent
Ryan D. Wagner
Cory M. Walker
Ryan John Weiss
Haley Elizabeth Whitaker
Carlos Roberto Whited
Cody James Williams
Walter Travis Work
Forrest Alexander Wortham
Austin Richard Wyer
Aaron Reed Young
Shiqi Zhong

Masters Graduates 2015-2016

Kapil Agrawal

Extending Capability and Implementing a Web Interface for the XALT Software Monitoring Tool.

Advisor: Dr. Gregory D. Peterson

Joe Larry Allen

pDroid.

Advisor: Dr. Jinyuan “Stella” Sun

Abdulqader Ahmed Almami

Non-thesis MS

Advisor: Dr. Bruce J. MacLennan

Arnab Jyoti Baruah

Non-thesis MS

Advisor: Dr. Jeremiah H. “Jeremy” Holleman

Jason Yen-Shen Chan

Implementation of a Neuromorphic Development Platform with DANNA.

Advisor: Dr. Mark Edward Dean

Donald Charles Collins

Dividing and Conquering Meshes within the NIST Fire Dynamics Simulator (FDS) on Multicore Computing Systems.

Advisor: Dr. David J. Icové

Joseph Richard Dorris

Non-thesis MS

Advisor: Dr. Jack Dongarra

James Steven Ferguson

Non-thesis MS

Advisor: Dr. Michael W. Berry

Paul Robert Giblock

HSP-Wrap: The Design and Evaluation of Reusable Parallelism for a Subclass of Data-Intensive Applications.

Advisor: Dr. Micahel D. Vose

William Henry Halsey

Non-thesis MS

Advisor: Dr. Jens Gregor

Tate Glick Hawkersmith

Autonomous Android: Autonomous 3D Environment Mapping with Android Controlled Multi-copters.

Advisor: Dr. Lynne Parker

Mohd Ishtiaque Ibn Hossain

Non-thesis MS

Advisor: Dr. Syed K. Islam

Yawei Hui

Non-thesis MS

Advisor: Dr. Jens Gregor

Edward Andrew Jones

Review and Characterization of Gallium Nitride Power Devices.

Advisor: Dr. Fei “Fred” Wang

Jeremy Joseph Langford

The Design and Validation of a Wireless Bat-Mounted Sonar Recording System.

Advisor: Dr. Jeremy Holleman

Rui Ma

An Application of the Universal Verification Methodology.

Advisor: Dr. Gregory D. Peterson

Meimanat Mahmoudi

Non-thesis MS

Advisor: Dr. Kevin Tomsovic

Zahra Mahoor

Non-thesis MS

Advisor: Dr. Bruce J. MacLennan

Alexander Lee McHale

An Integrated IGBT Active Gate Driver with Fast Feed-Forward Variable Current.

Advisor: Dr. Benjamin J. Blalock

Andrew Michael Nack

Standardizing Functional Safety Assessments for Off-the-Shelf Instrumentation and Controls.

Advisor: Dr. Gregory D. Peterson

Mohammad Ehsan Raoufat

Non-thesis MS

Advisor: Dr. Seddik M. Djouadi

Charles Kenneth Roberts

SiC Band Gap Voltage Reference for Space Applications.

Advisor: Dr. Benjamin J. Blalock

Alex Christopher Roschli

Dynamic Extruder Control for Polymer Printing in Big Area Additive Manufacturing.

Advisor: Dr. Benjamin J. Blalock

Aliceann Elizabeth (Wachter) Talley

Non-thesis MS

Advisor: Dr. Bradley T. Vander Zanden

Jacob Daniel Tobin

A Hardware Based Audio Event Detection System.

Advisor: Dr. Mark Dean

Siqi Wang

Non-thesis MS

Advisor: Dr. Kevin Tomsovic

Shiqi Zhong

Non-thesis MS

Advisor: Dr. Jens Gregor

Doctoral Graduates 2015-2016

Nora Dianne Bull Ezell

An Innovative Approach to Johnson Noise Thermometry by Means of Spectral Estimation.

Advisor: S. Djouadi

Jidong Chai

Wide-Area Measurement-Based Applications for Power System Monitoring and Dynamic Modeling.

Advisor: Y. Liu

Woon Cho

Hyperspectral Data Acquisition and its Application for Face Recognition.

Advisor: M. Abidi

Yutian Cui

High Voltage Point of Load Converter for Data Center Power Supplies.

Advisor: L. Tolbert

Sanjib Das

Interface and Morphology Engineering in Solution-Processed Electronic and Optoelectronic Devices.

Advisor: G. Gu

Andrew Scott Davis

Conditional Computation in Deep and Recurrent Neural Networks.

Advisor: I. Arel

Tingxing Dong

Batched Linear Algebra Problems on GPU Accelerators.

Advisor: J. Dongarra

Jin Dong

Stochastic and Optimal Distributed Control for Energy Optimization and Spatially Invariant Systems.

Advisor: S. Djouadi

Anis Drira

Characterization of Optimal Cyber Attacks on Control Systems.

Advisor: S. Djouadi

Xin Fang

Bi-Level Optimization Considering Uncertainties of Wind Power and Demand Response.

Advisor: F. Li

Xing Fu

Feedback-Directed Management of Performance and Power for Emerging Computer Systems.

Advisor: X. Wang

Ahmadreza Ghahremani

Multi-Physics Modeling.

Advisor: A. Fathy

Benjamin Frederick Goodrich

Neuron Clustering for Mitigating Cata-

strophic Forgetting in Supervised and Reinforcement Learning.

Advisor: I. Arel

Rui Guo

Face Centered Image Analysis Using Saliency and Deep Learning Based Techniques.

Advisor: H. Qi

Jiahui Guo

Data Analytics and Application Developments Based on Synchrophasor Measurements.

Advisor: Y. Liu

Blake Andrew Haugen

Performance Analysis and Modeling of Task-Based Runtimes.

Advisor: J. Dongarra

Qinran Hu

Incentive based Residential Demand Aggregation.

Advisor: F. Li

Fengkai Hu

Real-time Voltage Stability Monitoring and Control for Load Areas: A Hybrid Approach.

Advisor: K. Sun

Yulu Jia

Algorithm-Based Fault Tolerance for Two-Sided Dense Matrix Factorizations.

Advisor: J. Dongarra

Gefei Kou

Dynamic Modeling and Renewable Integration Studies on the U.S. Power Grids.

Advisor: Y. Liu

Yin Lei

Wide-Area Synchrophasor Measurement Applications and Power System Dynamic Modeling.

Advisor: Y. Liu

Xue Li

Using GPU to Accelerate Linear Computations in Power System Applications.

Advisor: F. Li

Getao Liang

Arithmetic Logic Unit Architectures with Dynamically Defined Precision.

Advisor: G. Peterson

Khandaker Abdullah Al Mamun

Design and Implementation of an Integrated Biosensor Platform for Lab-on-a-Chip Diabetic Care Systems.

Advisor: N. McFarlane

John Christopher Martin

Quantitative Metrics for Comparison of Hyper-dimensional LSA Spaces for

Semantic Differences.

Advisor: M. Berry

Stephen Gregory Marz

Reducing Power Consumption and Latency in Mobile Devices using a Push Event Stream Model, Kernel Display Server, and GUI Scheduler.

Advisor: B. Vander Zanden

Charles Alexander Phillips

Multipartite Graph Algorithms for the Analysis of Heterogeneous Data.

Advisor: M. Langston

Benjamin Scott Prothro

Magnetic Local Positioning System with Supplemental Magnetometer-Accelerometer Data Fusion.

Advisor: B. Blalock

Christopher Michael Reardon

An Intelligent Robot and Augmented Reality Instruction System.

Advisor: L. Parker

Xiaojie Shi

Analysis and Control of VSC Based HVDC System under Single-Line-to-Ground Fault Conditions.

Advisor: L. Tolbert

Lipeng Wan

Achieving High Reliability and Efficiency in Maintaining Large-Scale Storage Systems through Optimal Resource Provisioning and Data Placement.

Advisor: Q. Cao

Wei Wang

Exploiting Cross Domain Relationships for Target Recognition.

Advisor: H. Qi

Xiaodong Wang

Topology Design and Delay Control for Communication Networks in Smart Grid.

Advisor: H. Li

Liu Yang

Three-Phase Power Converter Based Real-Time Synchronous Generator Emulation.

Advisor: L. Tolbert

Tan Yang

Low-Noise Micro-Power Amplifiers for Biosignal Acquisition.

Advisor: J. Holleman

Weimin Zhang

Energy-efficient and Power-dense DC-DC Converters in Data Center and Electric Vehicle Applications Using Wide Bandgap Devices.

Advisor: F. Wang

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Knoxville, TN 37996-2250

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